Toxic Shock Syndrome

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Toxic shock syndrome (TSS) is a serious complication of infection with strains of *Staphylococcus aureus* that produce TSS toxin-1 (TSST-1) or strains of *Streptococcus pyogenes* that produce pyrogenic exotoxin A. *S. pyogenes* is more commonly known as group A *streptococcus* (GAS).

B. Clinical Description

TSS is a severe toxin-mediated illness with sudden onset of a high fever, vomiting, profuse watery diarrhea, and myalgia, followed by hypotension and potentially shock. During the acute phase of the illness, a "sunburn-like" rash is present. One to two weeks after onset, desquamation of the skin occurs, especially on the soles and palms. Typically, the fever is higher than 102°F, the systolic blood pressure is <90 mm Hg and three or more of the following organ systems are involved: gastrointestinal, muscular, mucous membranes (including vagina, pharynx, conjuctiva), renal, hepatic, respiratory, hematologic, and central nervous system. Blood, cerebrospinal fluid and throat cultures are negative for pathogens other than *S. aureus* or GAS. Rocky Mountain spotted fever, leptospirosis and measles should be ruled out. TSS can be fatal.

C. Reservoirs

Humans are the primary reservoir for both *S. aureus* and GAS.

D. Modes of Transmission

TSS itself is not communicable from person-to-person. *S. aureus* is transmitted from person-to-person through direct contact with lesions or contaminated respiratory secretions. Airborne transmission is rare but has been documented in small children with respiratory disease. GAS is also transmitted from person-to-person through large respiratory droplets or direct contact with infected lesions. GAS can also be transmitted through ingestion of contaminated food, most commonly eggs, milk and milk products, resulting in outbreaks of GAS pharyngitis. With both *S. aureus* and GAS, indirect contact through objects is rarely associated with illness, but it has occurred in schools through contaminated wrestling mats and in daycare centers through play food and other shared toys.

E. Incubation Period

The incubation period for *S. aureus* infection is variable, with a 4 to 10 day average. For GAS infection it is shorter, approximately 1 to 3 days, rarely longer. The median incubation period for post-surgical TSS is 2 days.

F. Period of Communicability or Infectious Period

TSS itself is not communicable from person-to-person. With *S. aureus,* the infectious period lasts as long as lesions drain or the carrier state exists. In untreated, uncomplicated GAS cases, the infectious period may be 10 to 21 days; if purulent discharges are present, the infectious period may be extended to weeks or months. Persons with untreated GAS pharyngitis may carry and transmit the bacteria for weeks or months, with decreasing contagiousness 2 to 3 weeks after illness onset.

G. Epidemiology

In 1980, TSS became widely recognized when an association between TSS and the use of tampons was established. Since that time, the proportion of TSS cases associated with menstruation has decreased. Cases of TSS have been associated with childbirth, abortions, vaginal infections, surgical wound infections, focal lesions of the bone or respiratory tract, and cutaneous or subcutaneous lesions. The source of infection is unknown in up to one-third of cases. Cases are seen in both males and females. Persons considered at risk for TSS include: 1) menstruating women using tampons or other inserted vaginal devices (such diaphragms or contraceptive sponges), and 2) persons with focal *S. aureus* or GAS infections.

2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. What to Report to the Massachusetts Department of Public Health

- A clinically diagnosed case of TSS, as reported by a healthcare provider.

B. Laboratory Testing Services Available

The Massachusetts State Laboratory Institute (SLI) does not provide services for the testing needed to confirm TSS. However, the SLI Reference Laboratory will test specimens for the presence of *S. aureus* or GAS. In some outbreak circumstances, isolates may be sent to Centers for Disease Control and Prevention (CDC) for toxin testing. For more information contact the Reference Laboratory at (617) 983-6607.

3) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify household and other close contacts for possible culture and treatment of the underlying bacterial cause.
- To initiate surveillance for concurrent cases of varicella in a school or daycare (for cases caused by GAS).
- To identify transmission sources of public health concern (*e.g.*, contaminated food or a health care worker who is a GAS carrier) and to stop transmission from such sources.

B. Laboratory and Healthcare Provider Reporting Requirements

Refer to the lists of reportable diseases (at the end of this manual's Introduction) for information.

C. Local Board of Health Reporting and Follow-Up Responsibilities

1. **Reporting Requirements**

Massachusetts Department of Public Health (MDPH) regulations (*105 CMR 300.000*) stipulate that each local board of health (LBOH) must report any case of toxic shock syndrome, as defined by the reporting criteria in Section 2) A above. Current requirements are that cases be reported to the MDPH Division of Epidemiology and Immunization, Surveillance Program using an official CDC *Toxic Shock Syndrome Case Report* form (in Appendix A). Refer to the *Local Board of Health Reporting Timeline* (at the end of this manual's introductory section) for information on prioritization and timeliness requirements of reporting and case investigation.

2. **Case Investigation**

a. It is the LBOH responsibility to complete a CDC *Toxic Shock Syndrome Case Report* form (Appendix A) by interviewing the case and others who may be able to provide information. Much of the information required on the form can be obtained from the case's healthcare provider or the medical record.

b. Use the following guidelines to assist you in completing the form:
   1) Accurately record the demographic information, date of symptom onset, whether hospitalized (and associated dates), and date of onset of menstrual period (if the patient is a menstruating female).
   2) Clinical findings, laboratory data and culture information are all important in defining a case. Collect the data for these sections of the case report form as accurately and completely as possible. You may ask the healthcare provider to submit a copy of the medical record to you or enlist his or her aid in completing these sections of the case report form.
   3) If the case is a menstruating woman, collect information on tampon and sanitary napkin/minipad use including the brand and style of product.
   4) If you have made several attempts to obtain case information, but have been unsuccessful (*e.g.*, the case or healthcare provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason why it could not be filled out completely.

c. After completing the form, attach lab report(s) and mail (in an envelope marked "Confidential") to the MDPH Division of Epidemiology and Immunization, Surveillance Program. The mailing address is:

MDPH, Division of Epidemiology and Immunization
Surveillance Program, Room 241
305 South Street
Jamaica Plain, MA 02130

d. Institution of disease control measures is an integral part of case investigation. It is the LBOH responsibility to understand, and, if necessary, institute the control guidelines listed below in Section 4), Controlling Further Spread.

4) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (*105 CMR 300.200*)

None.

B. Protection of Contacts of a Case

If it has been determined that the case was caused by GAS, household contacts of the case should have throat cultures taken, and if positive for GAS be treated with antibiotics. Other close contacts should be evaluated and cultured if symptomatic.

C. Managing Special Situations

Daycare

If the TSS is caused by GAS, consider throat cultures for all symptomatic daycare attendees and staff who are contacts of the case, with subsequent antibiotic treatment of those found to be GAS culture positive. Contact the Division of Epidemiology and Immunization for assistance in managing follow-up of a case in a daycare.

School

If the TSS is caused by GAS, consider throat cultures for all symptomatic classroom members and other close contacts of the case, with subsequent antibiotic treatment of those found to be GAS culture-positive. Contact the Division of Epidemiology and Immunization for assistance in managing follow-up of a case in a school.

Reported Incidence Is Higher than Usual/Outbreak Suspected

If you suspect an outbreak, investigate to determine the source of infection and mode of transmission. Seek a common exposure, such as association with a daycare center, and institute applicable preventive or control measures. Control of person-to-person transmission requires special emphasis on personal cleanliness and handwashing. Consult with the epidemiologist on-call at the Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850. The Division can help determine a course of action to prevent further cases and can perform surveillance for cases across town lines and therefore be difficult to identify at a local level.

D. Preventive Measures

Environmental Measures

Advise daycare centers to clean toys daily using an approved disinfectant and to discourage the use of play food, which facilitates the transmission of not only this bacterium but many others as well. Also advise schools to sanitize shared sports equipment, such as wrestling and gymnastics mats, frequently.

Personal Preventive Measures/Education

To avoid exposure, advise individuals to:

- Use the lowest absorbency tampon and change frequently. Discontinue tampon use *immediately* and call their healthcare provider if they develop a high fever and vomiting or diarrhea during menstruation.
- Follow directions for use of diaphragms or contraceptive sponges and do not leave the device in place for more than 30 hours.
- Complete the full course of treatment if prescribed antibiotics for staphylococcus or streptococcus infections.

ADDITIONAL INFORMATION

The following is the formal CDC surveillance case definition for TSS. It is provided for your information only. It is not necessary to use this information for reporting or investigating a case. (CDC case definitions are used by state health departments and CDC to maintain uniform standards for national reporting.) For reporting to a case to the MDPH use the criteria described in Section 2) A of this chapter.

Clinical Case Definition
An illness with the following clinical manifestations.

- **Fever:** temperature ≥102.0° F (≥38.9°C)
- **Rash:** diffuse macular erythroderma
- **Desquamation:** 1 to 2 weeks after onset of illness, particularly on the palms and soles
- **Hypotension:** systolic blood pressure ≤90 mm Hg for adults or less than fifth percentile by age for children aged <16 years; orthostatic drop in diastolic blood pressure ≥15 mm Hg from lying to sitting, orthostatic syncope, or orthostatic dizziness.
- **Multisystem involvement (three or more of the following):**
  Gastrointestinal: vomiting or diarrhea at onset of illness
  Muscular: severe myalgia or creatinine phosphokinase level at least twice the upper limit of normal
  Mucous membrane: vaginal, oropharyngeal, or conjunctival hyperemia
  Renal: Blood urea nitrogen or creatinine at least twice the upper limit of normal for laboratory or urinary sediment with pyuria (≥5 leukocytes per high-power field) in the absence of urinary tract infection
  Hepatic: total bilirubin, alanine aminotransferase enzyme, or asparate aminotransferase enzyme levels at least twice the upper limit of normal for laboratory
  Hematologic: platelets <100,000/mm^3
  Central nervous system: disorientation or alterations in consciousness without focal neurologic signs when fever and hypotension are absent

Laboratory criteria
Negative results on the following tests, if obtained:

- Blood, throat, or CSF cultures (cultures may be positive for *Staphylococcus aureus* or GAS)
- Rise in titre to Rocky Mountain spotted fever, leptospirosis, or measles.

Case classification
Probable: a case in which five of the six clinical findings described above are present.
Confirmed: a case in which all six of the clinical findings described above are present, including desquamation, unless the patient dies before desquamation occurs.

REFERENCES

American Academy of Pediatrics. *1997 Red Book: Report of the Committee on Infectious Diseases, 24th Edition*. Illinois, American Academy of Pediatrics, 1997.

CDC. Case Definitions for Infectious Conditions Under Public Health Surveillance, *MMWR*. 1997; 46:RR-10.

Chin, J., ed. *Control of Communicable Diseases Manual, 17th Edition.* Washington, DC, American Public Health Association, 2000.

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